

Rhodora

JOURNAL OF THE
NEW ENGLAND BOTANICAL CLUB

Vol. 62

April, 1960

No. 736

RECENT CHANGES IN SOME RHODODENDRON COLONIES IN MAINE AND NEW HAMPSHIRE

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That *Rhododendron maximum* leads a precarious existence in its few and scattered stations in northern and central New England is so evident that it does not need to be reaffirmed here. Changes in the environment might be expected therefore to exert a considerable effect on the species. The purpose of this paper is to document these effects in a number of colonies which we have had under observation during recent years and particularly to point out the extreme sensitivity of *Rhododendron* to certain kinds of disturbance. At the outset we can state that, of the many instances of decline of *Rhododendron* stands that have come to our attention, not one in either Maine or New Hampshire can be attributed mainly to *direct* despoliation by man.

R. maximum lends itself uniquely to a study involving a recording of the areal extent of stands because, being singularly unusual in appearance as well as uncommon, it has attracted much attention and comment since comparatively early times. Also the fact that it occurs by itself, dominating its habitat makes it easy and tempting to estimate the size of colony. Thus there are many statements in the literature giving the sizes of stands when first reported and often we have found local inhabitants familiar with the colonies that we have visited, well prepared in most instances to tell us the acreage of the colony at some earlier time. Of course it is not safe to rely too precisely on such data, but trends

Published with the approval of the Director of the New Hampshire Agricultural Experiment Station as Scientific Contribution No. 250.

are certainly indicated that are borne out by our own observations during successive visits or by reports in the literature.

Fluctuations in colony at Lexington, Maine. — F. H. Cowan¹ reporting in 1899 that this colony covered “over half an acre” made the additional comment “It is said that as early as 1845, one Nathan Safford, who lived near the pond, found these strange flowers and that, at that time, only a few square rods were covered by the plants.” Mr. C. H. Knowlton visited the colony on August 20, 1949 and reported² as follows: “The shrub was discovered in 1845 by one Nathan Safford who lived nearby and the stand has spread from a few square rods to nearly two acres. About a quarter of this area is now full of dead shrubs, perhaps due to change in water-level.”

We have visited this area on two occasions the earlier in November 1951 the more recent on July 19, 1954. In 1951 it seemed to us that the colony was vigorous and showed no more striking signs of deterioration, except in size, than were apparent to Knowlton two years before. By pacing, we calculated the stand to be about 200 feet long by 150 feet wide, the area thus to be about three quarters of an acre. Some of the difference in size as noted by Knowlton and ourselves may be due to errors in estimation but some undoubtedly may be laid to the killing off of plants at the periphery of the colony. In 1954 the stand was reduced in size to much less than half of its 1951 size. The undoubted agents of destruction were deer which apparently have yarded in the area and had nipped off since 1951 an estimated one-half to two-thirds of the shoots around the colony, leaving untouched, at that time, only a small part of the stand at its center. Earlier nipping by deer occurred at heights of about 3-4 feet, the probable depth of snow in midwinter. More recent foraging had taken place on stems about a foot high. In either case virtually all stems thus mutilated lost all of their foliage and subsequently died leaving considerable areas of naked dead stems where luxuriant growth was

¹ Cowan, F. H., *Rhododendron maximum* in Somerset County, Maine. *Rhodora* 1: 55, March 1899.

² Knowlton, C. H. *Rhododendron maximum* in New England, *Rhodora* 52: 215-218, Sept. 1950.

present in 1951. This attractiveness of rhododendrons for deer has been shown in other areas.^{3,4} We noted in 1954 considerable reproduction by seedlings among the living and dead plants which shows that the colony could perpetuate itself once the deer cease their depredations.

Sanford, Maine colony. — Knowlton loc. cit. p. 216 wrote "three acres are covered" by the rhododendrons. It is not certain where or when he obtained this information. But as a result of several visits in recent years, the first on July 7, 1955, we estimate the total area covered by both dense growth and scattered plants as something like five acres. Considerable reproduction of seedlings was noted particularly at the edge of the colony on the east where new plants were filling in between older clumps and the entire colony was expanding its area somewhat. The colony at present lies almost entirely on a slope to the north of which is a swamp or wet sedge-meadow which seems to be developing into a red maple swamp. Some rhododendron seedlings in recent years are appearing beyond the parent plants at the edge of the swamp.

While of a less spectacular nature than at Lexington, Maine, the change in extent of coverage of the Sanford, Maine colony is mentioned here to show that rhododendron stands can spread when environmental conditions are suitable.

Albany, New Hampshire colony at Bald Hill. — This small but well known stand was first reported by St. John⁵ in 1916 who wrote of it as follows: "the trees fifteen feet in height made a solid stand over an acre of ground." In 1938 the late Mr. Elmer Littlefield of Conway, who at that time owned land near the rhododendron tract guided the senior author into the area. On April 3, 1954 Messrs. Frederic Steele and Alexander Lincoln, Jr., visited the colony and recorded their observations and on November 15, 1955 the present authors visited the tract to obtain seeds and to note the condition

³ Forbes, E. B. and S. I. Bechdel, Mountain laurel and Rhododendron as foods for white-tailed deer. *Ecol.* 12:323, 1930.

⁴ Forbes, E. B. and L. O. Overholts, Deer carrying capacity of Pennsylvania woodland. *Ecol.* 12:750, 1931.

⁵ St. John, Harold. Additional notes on *Rhododendron maximum* in New Hampshire. *Rhodora* 18:73-74, April, 1916.

of the stand. The senior author's impression from the 1938 visit is of an extensive and lush growth of rhododendrons in a fairly open forest of mixed conifers and hardwoods. Steele and Lincoln in their April 1954 notes (unpublished) comment on rhododendrons being stunted and in poor condition above the ledges and beneath the developing forest.

Our visit in November 15, 1955 showed the rhododendrons to have almost completely disappeared under the very dense blanketing growth about 15-20 feet high of dominant *Tsuga canadensis* with scattered trees of *Picea rubens*. Occasional weak plants still persisted under the conifers. The colony was reduced essentially to some straggling plants somewhat unevenly covering an area of ledge about 60 feet wide by 200 feet long. Here the rhododendrons were associated with deciduous trees chiefly and were reproducing satisfactorily by seedlings in 1955. The reduction of this colony to about one-third of its earlier size resulted from the removal of the bigger trees from much of the stand. The plants here have suffered first from their complete exposure by cutting or removal of protecting trees, and subsequently by their being shaded out by overtopping conifers.

Pittsfield, New Hampshire colony. — On two occasions we have searched in vain for a small stand of rhododendrons in Pittsfield, about three-quarters of a mile northwest of the well known station at Adams Pond. On each occasion we had a different guide who was not aware of the other's interest in the plant. Both moreover were familiar with the plants at Adams Pond and both led us to the same locality — an area of recently cut-over woods covered with slash. The removal of protecting trees and the piling up of slash, the two most obvious disturbances from lumbering operations have caused the complete destruction of this rhododendron colony.

Manchester, New Hampshire colonies. — Most extraordinary changes have occurred to two stands of rhododendron in Manchester. We are indebted to Dr. Maurice Provost, now of Vero Beach, Florida, for the description of a colony which he discovered along Millstone brook. From his journal-account written at the time of his discovery on April 26, 1935, we quote the following, "all along the brook, for near-

ly one-quarter mile it formed a dense thicket which in places rose to almost 20 feet above the boggy ground." By following his directions which were most explicitly given in the journal, the senior author, on September 26, 1955, found the locality with little trouble. But the stand had shrunk in the interim to a few scattered meagre patches none over 7 or 8 feet in height. The area where the plants once grew so luxuriantly is now drier and more densely wooded than it was in 1935. These trees in 1955 were young, the indication being that there has been a drastic change in the associated forest since 1935.

Two reports from the last century allude to the presence in Manchester of a very large area occupied by rhododendrons. Wm. E. Moore in 1897⁶ made the following comment, "About 2 miles northwest of Amoskeag Falls, lying to the east of and near the Valley of Black Brook is a great thicket covering from 60-80 acres and known as Rhododendron or Cedar Swamp." This without question is the place that Frederick W. Batchelder wrote about in 1899⁷ as follows: "A high, wet swamp, difficult of access, near the northwest corner of Manchester, has long been known as a station of the beautiful 'rosebay'. The plants are usually in flower about July 4th. The swamp having recently been denuded of its trees the rhododendrons have not flowered as well as formerly, and after very cold winters the buds are mostly blighted."

On April 20, 1954 we visited the remnant of this stand guided by Mr. James Proctor, who lived nearby. The rhododendrons now are nearly confined to the swamp-border where the plants cover not more than 2 acres. Only occasional and very scattered plants could be seen in the swamp itself. The forest has developed very slowly during the approximately 60 years since the swamp was cleared. The occurrence of scattered rhododendrons in the swamp in 1955 indicates that with the improvement of conditions it again may become filled with the shrub.

⁶ Moore, Wm. E. Contributions to the History of Derryfield, 35, 1897.

⁷ Batchelder, F. W. Preliminary list of plants in the vicinity of Manchester, New Hampshire in Proceedings of Manchester Institute of Arts and Sciences 1: pp. 110-111, 1899.

Hopkinton Colony. — We visited this small stand on June 2, 1959. The owner Frank Kimball, told us at that time that the plants had diminished greatly after the protecting forest trees had been cut off about 65 years before. With regrowth of suitable species including *Tsuga canadensis*, *Betula lutea*, *Fagus grandifolia* and *Acer rubrum* in the immediate vicinity this colony has regained its earlier size. The colony is not now reproducing by seedlings perhaps because the plants have so recently reached maturity and also possibly because the composition of the forest adjacent to the stand is not yet favorable for the growth of seedlings.

Richmond rhododendrons. — This colony, one of the earliest known in New Hampshire, had not been observed except by local residents for many years until it was rediscovered by Mr. Tudor Richards, the County Forester of Cheshire and Sullivan Counties. On May 19, 1956 we visited this stand which now consists only of scattered clumps growing over about 1½ acres of swampy forest land. Mr. M. Martin Fay the present owner told us that the rhododendrons originally covered about 7-8 acres, the growth being very luxuriant about 65 years ago, at which time the area was cut over without any concern for the rosebay. The rhododendrons as a result almost entirely disappeared. Presumably this explains why the Richmond colony that once was as well known as the famous stand in Fitzwilliam, became quite forgotten.

It is unfortunate that *R. maximum* is so sensitive to any marked disturbance of the forest trees with which it is commonly associated. Its effective conservation obviously depends on maintaining a mixed forest of mature or fairly mature trees to permit (1) some protection of larger rhododendron plants from excessive sunlight as well as over shading, (2) to provide suitable edaphic conditions throughout the year and (3) to make conditions right for seed germination and seedling growth.

It is reassuring that some colonies, like that in Sanford, Maine, have held their own or even improved in recent years. It is perhaps significant that many of our colonies are so situated that when conditions become intolerable in the swamp the plants can still survive on the better drained

swamp-border, the converse also being true when the conditions are reversed.

There is also some possibility that colonies of *R. maximum* may spread and then contract in a natural way in response to such factors as aging of the individuals that make up a stand or perhaps in response to climatic changes. —
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NEW AND INTERESTING VASCULAR PLANT RECORDS FROM KANSAS

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Intensive field studies in Kansas have resulted in the finding of eight species previously unreported for the State and new collection records for nine of the rarer species. Specimens are on file in the Herbarium, The University of Kansas.

SPECIES NEW TO KANSAS

Hilaria jamesii (Torr.) Benth. This species is not recorded for Kansas in any manual or State list. It may now be listed for southwestern Kansas with data as follows: Common on sandy soil in the Cimarron River valley, 8 miles north of Elkhart, Morton County, July 9, 1958, *McGregor 13981*.

Eleocharis atropurpurea (Retz.) J. & C. Presl. Found in large quantities on the margin of shallow ponds in the sand dunes north of Burrton, Harvey County, June 25, 1959, *McGregor 14531*. The species was associated with strand plants of *Marsilea mucronata* A. Br.

Holosteum umbellatum L. This naturalized species has become somewhat frequent in central and southcentral Kansas. It is now known from Mitchell, Rice, Reno, Kingman, Pratt, and Barber counties where it is found, during April, on sandy soils of lawns, fields, and roadside banks. Specific data on a representative collection is as follows: one mile east of Kingman, Kingman County, sandy field, April 26, 1959, *McGregor 14204*.

Chorispora tenella (Willd.) D C. The first record of this adventive species was a fragmentary specimen sent to me from Rice County in 1947. It has since been found in Chautauqua, Butler, Harvey, Riley and Rice counties. It has been found only in lawns, near feed lots and roadside banks. A representative collection is as follows: roadside bank, ½ mile south of Lyons, Rice County, April 24, 1959, *McGregor 14173*.

Vicia ludoviciana Nutt. Frequent on red gypsum soil prairies, seven miles west of Medicine Lodge, Barber County, May 28, 1957, *McGregor, 12863*. Plants occur as scattered individuals on prairie hillsides and in ravines.